The opinion in support of the decision being entered today is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Ex parte THOMAS J. MCINTYRE and CHARLES N. ALCORN

Appeal 2007-2202
Application 10/608,169
Technology Center 2800

Decided: September 27, 2007

Before JAMES D. THOMAS, LEE E. BARRETT, and ROBERT E. NAPPI, *Administrative Patent Judges.*

NAPPI, *Administrative Patent Judge.*

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 of the Final Rejection of claims 1 through 13, Appellants have not appealed the Examiner's Final Rejection of claims 14 through 23.

We affirm-in-part.

INVENTION

The invention is directed to photonic circuits that can be variably tuned to select or filter a spectrum of light. See page 1 of Appellants' Specification. Claim 1 is representative of the invention and reproduced below:

> 1. A photonic circuit comprising:
>
> a resonator;
>
> means for heating said resonator;
>
> means for measuring a temperature of said resonator;
>
> means for coupling said temperature measuring means to said heating means; and
>
> logic associating one or more frequencies of light to one or more temperatures of said resonator;
>
> wherein said temperature measuring means monitors said temperature of said resonator and transmits signals to said heating means based on said temperature and said logic; and further
>
> wherein said heating means is enabled or disabled so that said resonator is maintained at a precise temperature and selectively filters a frequency of light corresponding to said temperature.

REFERENCES

Schwindt	US 6,720,782 B2	Apr. 13, 2004 (filed Oct. 17, 2002)
Ueda	US 6,498,878 B1	Dec. 24, 2002 (filed Sep. 7, 2000)
Eggleton	US 6,438,277 B1	Aug. 20, 2002 (filed Jun. 3, 1999)
Koizumi	US 5,696,543	Dec. 9, 1997
Huber	US 5,159,601	Oct. 27, 1992

REJECTIONS AT ISSUE

Claims 1 through 3, 6 through 8, 10, 11, and 13 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Huber. The Examiner's rejection is set forth on pages 3 through 5 of the Answer.

Claims 1, 3, 4, 6, and 7 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Ueda. The Examiner's rejection is set forth on pages 5 and 6 of the Answer.

Claims 1, 3, 6 through 8, 10, and 11 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Eggleton. The Examiner's rejection is set forth on page 6 of the Answer.

Claims 5 and 9 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Huber and Koizumi. The Examiner's rejection is set forth on page 7 of the Answer.

Claim 12 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Huber and Schwindt. The Examiner's rejection is set forth on pages 7 and 8 of the Answer.

Throughout the opinion we make reference to the Brief (filed November 29, 2005), the Reply Brief (filed March 31, 2006) and the Answer (mailed June 26, 2006) for the respective details thereof.

PRINCIPLES OF LAW

A "claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2

USPQ2d 1051, 1053 (Fed. Cir. 1987). Analysis of whether a claim is patentable over the prior art under 35 U.S.C. § 102 begins with a determination of the scope of the claim. We determine the scope of the claims in patent applications not solely on the basis of the claim language, but upon giving claims their broadest reasonable construction in light of the specification as it would be interpreted by one of ordinary skill in the art. *In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359, 1364, 70 USPQ2d 1827, 1830 (Fed. Cir. 2004). The properly interpreted claim must then be compared with the prior art.

"It is well settled that a prior art reference may anticipate when the claim limitations not expressly found in that reference are nonetheless inherent in it. 'Under the principles of inherency, if the prior art necessarily functions in accordance with, or includes, the claimed limitations, it anticipates.'" *In re Cruciferous Sprout Litig.*,301 F.3d 1343, 1349, 64 USPQ2d 1202, 1206 (Fed. Cir. 2002) (citations and internal quotation marks omitted). "Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient." *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1951 (Fed. Cir. 1999) (citations and internal quotation marks omitted).

"[A] prima facie case of anticipation [may be] based on inherency." *In re King*, 801 F.2d 1324, 1327, 231 USPQ 136, 138-39 (Fed. Cir. 1986). Once a prima facie case of anticipation has been established, the burden shifts to the Appellant to prove that the prior art product does not necessarily or inherently possess the characteristics of the claimed product. *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977) ("Where, as here, the claimed and prior art products are identical or substantially identical, or are produced by identical or substantially identical processes, the PTO can require an applicant to prove that the

prior art products do not necessarily or inherently possess the characteristics of his claimed product."). *See also In re Spada*, 911 F.2d 705, 708-09, 15 USPQ2d 1655, 1657-58 (Fed. Cir. 1990).

ANALYSIS

Anticipation rejection based upon Huber.

Appellants argue, on page 5 of the Brief, that the Examiner's rejection under 35 U.S.C. § 102(b) based on Huber is in error. Appellants reason that "[t]he grating 18 of Huber is a mirror that depends on the physical alteration on the period of the grating to determine the wavelength of light that is reflected by the laser" and as such does not meet the claimed resonator. (Brief 5-6.)

The Examiner responds, on page 8 of the Answer, stating:

> The grating 18 constitutes a partially transmitting mirror which is an integral part of the optical fiber laser 17, which by definition is a resonator. Generally, a resonator is a device that under certain conditions achieves a specific operational condition, the so called resonance condition. It is noted that Appellant has not provided a definition or a description of what a "resonator" is, other than stating in couple occasions that "Used as a switch, a photonic resonator can be turn on, i.e., permit the passage of light of a certain frequency, or turned off, i.e., not allow the passage of light of a certain frequency', see [00002] of Disclosure. Huber's laser is an optical resonator, which depending on certain parameters, such as the physical properties of the optical cavity (comprising mirror 14, partial mirror/grating 18 and the length of optical fiber 16 between said two mirrors), achieves resonance condition for lasing, i.e., emitting light of specific only wavelength/frequency.

Appellants address the Examiner's response by arguing "Huber does [not] vary the refractive index of a resonator, but changes the grating spacing of a laser cavity by heating piezoelectric means. It does not teach a color selection by changing the refractive index of a resonator." (Reply Brief 2.)

Appellants' arguments have not persuaded us of error in the Examiner's rejection. We find that the Examiner's determination that Huber's laser and grading meets the claimed resonator to be reasonable. Neither of the independent claims recite a color selection based upon changing a refractive index of a resonator. While claim 1 is in means-plus-function format, the resonator limitation is not in means-plus-function format. While Appellants' Specification may describe the resonator as being a device which can perform such functions, we do not consider the claim to be limited to a device that performs such functions. Thus, Appellants have not persuaded us of error in the Examiner's finding that the laser of Huber meets the claimed resonator.

Appellants further argue, on page 7 of the Brief:

> [C]laims 1 and 7 recite that a temperature/frequency pair is retrieved from a logic device, and the temperature of the resonator is adjusted to that temperature in order to precisely control the frequency selected by the photonic circuit. Huber refers to a laser, not a photonic switch, and hence does not disclose the precise control of the present invention, but is only concerned with maintaining the wavelength within a laser's gain bandwidth. See Huber col. 1, lines 40-45. Moreover, Huber does not disclose either a processor or a memory such as disclosed and claimed by the present invention for the precise control of selected frequencies.

On page 8 of the Brief, Appellants argue that the Examiner's finding that Huber inherently uses logic is in error. Appellants reason that "the 'simplest form' of logic put forth as an example in the Office Action does not include a logical handling of light frequencies, but only a comparison to determine if a measured temperature is equal to a set temperature."

In response, the Examiner states that the claim does not recite a limitation directed to a photonic switch. (Answer 9.) Further, the Examiner finds that the

feedback control in Huber is not possible unless there is some logic that associates sensed temperature (and corresponding wavelengths) with target temperatures.

These arguments by Appellants have convinced us of error in the Examiner's rejection of independent claim 7, but not of error in the rejection of claim 1. We concur with the Examiner's claim interpretation, and find no limitation in either claims 1 or 7 directed to a photonic switch. Regarding the claimed logic, while claim 1 is in means-plus-function format, the logic limitation is not in means-plus-function format. Thus, while Appellants' Specification may describe the logic as including memory and a processor, we do not import such limitations to the claim. Claim 1 recites "logic associating one or more frequencies of light to one or more temperatures of said resonator," but does not recite a memory or processor. Thus, the claim 1 "logic" limitation is broad enough to encompass any type of logic in which one frequency is associated with one temperature. On the other hand, claim 7 recites that a frequency is stored in a logic device and that a temperature is stored in a logic device. Thus, claim 7 does recite that the logic includes a storage or memory. Claim 7 also recites a processor, however the claim does not recite that the processor is associated with the logic device.

The Examiner has found that the temperature control circuit of Huber inherently contains a logic equating a frequency to a temperature and as such contains a processor and memory. While we agree with the Examiner that the control circuit inherently contains logic, we disagree that this necessarily includes a processor and memory. Huber teaches that a control means is used to control the temperature of the heating element to tune the laser wavelength. From this, we find that one skilled in the art would recognize that there is a set point temperature, associated with the frequency of operation of the laser, which the heater is used to

maintain. We consider this basic control to meet the logic of claim 1. However, we do not find that this control necessarily contains a storage (memory) containing a frequency and a temperature associated with the frequency. Thus, we do not consider this control to meet the logic device of claim 7.

For the aforementioned reasons we reverse the Examiner's rejection of independent claim 7 and dependent claims 8, 10, 11, and 13 under 35 U.S.C. § 102(b) as being anticipated by Huber. However, we affirm the Examiner's rejection of independent claim 1. Appellants have not provided separate arguments directed to dependent claims 2, 3, and 6. Accordingly, similarly, we affirm the Examiner's rejection of claims 2, 3, and 6 under 35 U.S.C. § 102(b) as being anticipated by Huber.

Anticipation rejection based upon Ueda.

Appellants argue, on page 8 of the Brief, that the Examiner's rejection under 35 U.S.C. § 102(e) based upon Ueda is in error. Appellants reason that "[i]n the present application, the temperature of the resonator directly affects the refractive index of the resonator, thereby determining the frequency selected by the circuit. Consequently, the waveguides of Ueda are not resonators." (Brief 8-9.) Appellants also argue that the claims recite a photonic switch which retrieves a temperature/frequency pair from logic in a precise frequency selection scheme which is not taught by Ueda. Further, Appellants argue, that for the reasons discussed with respect to Huber, Ueda does not inherently teach logic as claimed. (Brief 9.)

The Examiner responds, on page 10 of the Answer, stating:

> Appellant has not defined what a "resonator" is, only stating what the resonator does ("In the present application, the temperature of the resonator

> directly affects the refractive index of the resonator, thereby determining the frequency selected by the circuit.") see sentence bridging pages 8 and 9 in Appeal Brief. In this sense, this is exactly what occurs in the device of Ueda, where changes in the temperature of the arrayed waveguides 14 affect their relative length and positioning (by changes to their refractive index), resulting in the center wavelength of each of the output waveguides 16 coinciding with the desired wavelength (i.e., the "resonance" condition), see lines 33-41, col. 4.

Further, the Examiner finds that Ueda's system of controlling the temperature of the waveguide to insure that the emitted wavelength is close to the desired wavelength implies that there is a temperature frequency pair stored and that this control inherently contains some kind of logic.

As with the rejection based upon Huber, Appellants' arguments directed to the rejection based upon Ueda have not persuaded us of error in the Examiner's rejection of claim 1, but have persuaded us of error in the Examiner's rejection of claim 7. We concur with the Examiner's finding that Ueda, teaches that the waveguides items 14, have a refractive index which changes based upon temperature. (Col. 2, ll. 8-14.) While, as discussed *supra* with respect to the rejection based upon Huber, we concur with the Examiner's broad interpretation of the term resonator, we nonetheless find that Ueda meets the more narrow definition of a device where the refractive index is altered by changes in temperature. Thus, we find that Ueda meets Appellants' claimed resonator.

Contrary to Appellants' assertions, neither of the independent claims recite a photonic switch. Thus, whether or not Ueda teaches a photonic switch is irrelevant.

Further, we find that Ueda teaches that the temperature of the waveguides is kept constant by a control system, and as such the lengths and the center wavelength of the wave guides is maintained constant. (Col. 4, ll. 33-41.) From

this, we find that one skilled in the art would recognize that there is a temperature, which the control system is set to maintain, associated with the desired center frequency the waveguides. As discussed above, the "logic" limitation of claim 1 is broad enough to encompass any type of logic in which one frequency is associated with one temperature. Thus, we consider the control system of Ueda to meet the logic of claim 1. However, we do not find that this control necessarily contains a storage (memory) containing a frequency and a temperature associated with the frequency. Thus, we do not consider this to meet the logic device of claim 7.

For the aforementioned reasons we reverse the Examiner's rejection of independent claim 7 under 35 U.S.C. § 102(e) as being anticipated by Ueda. However, we affirm the Examiner's rejection of independent claim 1. Appellants have not provided separate arguments directed to dependent claims 3, 4, and 6. Accordingly, we similarly affirm the Examiner's rejection of claims 3, 4, and 6 under 35 U.S.C. § 102(e) as being anticipated by Ueda.

Anticipation rejection based upon Eggleton.

Appellants argue, on page 10 of the Brief, that the Examiner's rejection under 35 U.S.C. § 102(e) based upon Eggleton is in error. Appellants argue that Eggleton is directed to thermally stabilized device whereas their invention is a precisely controlled photonic switch with infinitely variable and precise control of the selected frequency. (Brief 10.) Appellants also argue that Eggleton's processor only has a single control signal, not extensive temperature and frequency logic to infinitely and variably select a frequency. (Brief 10.) Further, Appellants argue that Eggleton does not inherently contain logic as claimed. (Brief 10-11.)

In response the Examiner states, on page 11 of the Answer:

> First, nowhere in the language of claims 1, 3[,] 6-8, 10-1 1 is there a mention of a photonic "switch". Second, even though Eggleton only mentions that the feedback control is used to stabilize the circuit against ambient changes of temperature (lines 18-25, col. 3), it is noted that Eggleton clearly states that the controller 15 receives a primary control signal indicative of a desired setting for the tunable optical device (lines 9-1 1, col. 3), i.e., the device is tunable (implying multiple temperature/wavelength pairs). However, in any case, it is noted that the claim language recites *one* or more frequencies and *one* or more temperatures (emphasis added), hence Eggleton does contain the disputed limitation.

Appellants' arguments directed to the rejection based upon Eggleton have not persuaded us of error in the Examiner's rejection of independent claims 1, and 7. As discussed above neither independent claim 1 nor independent claim 7 recites a photonic switch, nor do the claims recite infinitely variable and precise control of the frequency. Thus, whether or not Eggleton teaches a photonic switch with infinitely variable control is irrelevant. We concur with the Examiner's finding that Eggleton teaches a control circuit to stabilize the temperature of a thermally tunable optical device. (Col. 2, ll. 64-66.) We find that Eggleton's control circuit receives a signal indicative of the desired setting of the optical device. (Col. 3, ll. 10-11.) Further, we note that Eggleton teaches that these devices are thermally tuned to a specific wavelength. (Col. 1, ll. 36-40.) As such, one skilled in the art would recognize that the desired setting is a frequency, and that that frequency is associated with a temperature. As discussed above, the "logic" limitation of claim 1 is broad enough to encompass any type of logic in which one frequency is associated with one temperature. Thus, we consider the control system with the control signal input of Eggleton to meet the logic of claim 1. Further, as Eggleton

contains a microprocessor, (item 15, figure 1) we find that it necessarily includes some form of storage or memory. As the processor receives a control signal indicating a desired setting (frequency to be tuned to), and controls the heater to maintain the appropriate temperature, these values must be stored in some form of storage. Thus, we concur with the Examiner's finding that the skilled artisan would recognize that Eggleton's device includes logic that stores the frequency selected by the photonic device and a temperature, where the temperature is associated with the frequency. Thus, Appellants' arguments have not persuaded us of error in the Examiner's rejection based upon Eggleton. Accordingly, we affirm the Examiner's rejection of claims 1, 3, 6 through 8, 10, and 11 under 35 U.S.C. § 102(e) as being anticipated by Eggleton.

Rejections based upon 35 U.S.C. § 103(a).

Appellants argue on, page 11 of the Brief, that the Examiner's rejections of claims 5, 9, and 12, are in error as Huber does not teach the logic limitation discussed with respect to independent claims 1 and 7. Further, on page 3 of the Reply Brief, Appellants argue that Koizumi is non-analogous art.

We are not persuaded by Appellants' arguments with respect to claim 5, however, we are persuaded with respect to claims 9 and 12.

Claim 5 is dependent upon claim 1, and does not further limit the "logic" limitation of claim 1. As discussed above we find that Huber teaches the logic as claimed in claim 1. Further, in rejecting claim 5, the Examiner relied upon Koizumi's teaching that aluminum temperature sensors were known and concluded that using such a sensor for the temperature sensor in Huber's device would be obvious. The Supreme Court has recently stated that "[t]he combination of familiar elements according to known methods is likely to be obvious when it does

no more than yield predictable results." *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1739, 82 USPQ2d 1385, 1395 (U.S. 2007). We consider the use of Koizumi's aluminum temperature sensors in Huber's system to be nothing more then the combination of familiar elements for the known purpose (i.e. an aluminum temperature sensor to sense temperature) and as such consider the combination to be obvious. Thus, we affirm the Examiner's rejection of claim 5 under 35 U.S.C. § 103(a).

Claims 9 and 12 are ultimately dependent upon claim 7. As discussed above, we do not find that Huber teaches the logic as claimed in claim 7. Thus, we reverse the Examiner's rejection of claims 9 and 12 under 35 U.S.C. § 103(a).

SUMMARY

We affirm the Examiner's rejection of :

-claims 1 through 3, and 6 under 35 U.S.C. § 102(b) as being anticipated by Huber;

-claims 1, 3, 4, and 6 under 35 U.S.C. § 102(e) as being anticipated by Ueda;

-claims 1, 3, 6 through 8, 10, and 11 under 35 U.S.C. § 102(e) as being anticipated by Eggleton; and

-claim 5 under 35 U.S.C. § 103(a) as being unpatentable over Huber and Koizumi.

We reverse the Examiner's rejection of:

-claims 7, 8, 10, 11, and 13 under 35 U.S.C. § 102(b) as being anticipated by Huber;

-claim 7 under 35 U.S.C. § 102(e) as being anticipated by Ueda;

-claim 9 under 35 U.S.C. § 103(a) as being unpatentable over Huber and Koizumi; and

-claim 12 under 35 U.S.C. § 103(a) as being unpatentable over Huber and Schwindt

CONCLUSION

The decision of the Examiner is affirmed-in-part.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv) (2006).

AFFIRMED-IN-PART

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